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D.C. John Ta

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09/06/2005

LAUBSCHER SEVERSON

1160 SPA RD

SUITE 2B

ANNAPOLIS, MD 21403

EXAMINER

ABELSON, RONALD B

ART UNIT

PAPER NUMBER

2666

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/036,153

Applicant(s)

TA ET AL.

Examiner

Ronald Abelson

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2666

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12/30/04 10/5/04 6/21/04 3/30/04 6/9/03. 3/31/03, + 10/24/01
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12/30/04 10/5/04 6/21/04 3/30/04 6/9/03, + 3/31/03, + 10/24/01
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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3. Claim 1, 2, 17, and 22 - 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Field (US 5,428,616) in view of Saunders (US 2002/0097463).

Regarding claims 1 and 17, Field teaches a data switch node (fig. 1 box 1, col. 1 line 66 - col. 2 line 4).

Field teaches a PDU classifier extracting header information from PDUs received via a plurality of ports (fig. 1 box 1, 2, packet switching node: Note, only one port shown) associated with the data switching node (fig. 4 elements H, each incoming packet is processed, header H with a plurality of information fields, col. 2 lines 33-37).

Field teaches a receive trace record having entries, each receive trace entry specifying timed information regarding a corresponding received PDU (fig. 4 element TS, time stamp field TS, col. 2 lines 33-37, fig. 2 box 12, time stamp field TS provide an accumulative value of the transmission delay, col. 3 line 31 - col. 4 line 5). The examiner corresponds the applicant's receive trace entry with the reference's TS value of the received packet before adding the time the packet was in the queue.

Field teaches a switching function processing PDUs (fig. 1 box 1, col. 1 line 66 - col. 2 line 4).

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Field teaches a transmit trace record having entries, each transmit trace record specifying timed information regarding a corresponding processed PDU (measure the time each packet spends in the queue, col. 3 line 34 - col. 4 line 5).

Note, the examiner corresponds the applicant's receive trace record with the data structure of Field wherein the timing information corresponding to the received PDU and transmitted PDU are stored.

Although Field teaches a processor (fig. 2 box 12), the reference is silent on using the information stored in the trace record entries to evaluate the performance of the switching function.

Saunders teaches using the information stored in the trace record entries / (time between a packets arrival and departure at a particular router/switch) to evaluate / measure the performance of the switching function ([0015], latency is the delay suffered by a packet during its travel, time packet arrives at a router until it leaves for the next router/switch latency). Note, latency is a measure of the performance of the router/switch.

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Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of Field by having the packet controller (Field: fig. 2 box 12) use the measured value of the time each packet is in the queue (Field: col. 3 line 34 - col. 4 line 5) in order to determine the switch latency. This modification can be performed in software. The suggestion for the modification is traffic can be prioritized based upon delay tolerances (Saunders: [0011]). By knowing the latency of each switch, the system would be able to route real-time data based upon the latencies of the switches in the system.

Regarding claim 2, the switching data node comprises a timer (Field: fig. 2 box 14, col. 3 line 34 - col. 4 line 5).

Regarding claim 22, as previously shown, populating a time stamp specifier associated with the receive trace entry with a time value indicative of the time at which the PDU was deemed to be received (Field: fig. 4 element TS, time stamp field TS, col. 2 lines 33-37, fig. 2 box 12, time stamp field TS provide an accumulative value of the transmission delay, col. 3 line 31 - col. 4 line 5).

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Regarding claim 23, as previously shown, populating a time stamp specifier associated with the transmit trace entry with a time value indicative of the time at which the PDU was deemed to be processed (Field: measure the time each packet spends in the queue, col. 3 line 34 - col. 4 line 5).

Regarding claim 24, as previously shown, determining a PDU processing delay by calculating the difference between time stamp values held in a receive trace record entry and a transmit trace record entry corresponding to the PDU (Field, measure the time each packet spends in the queue, col. 3 line 34 - col. 4 line 5).

4. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as applied to claim 1 above, and further in view of Berning (US 6,038,619).

Regarding claim 3, although the combination teaches trace record entries, the combination is silent on each one of the trace records comprises a circular buffer storing the trace record entries.

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Berning teaches storing entries in a circular buffer (circular buffer, writing into the buffer, col. 5 lines 30-43).

Regarding claim 4, the combination is silent on each circular buffers includes an index pointer specifying the next trace record entry to be populated.

Berning teaches a circular buffer includes an index pointer specifying the next entry to be populated (associated pointer, col. 5 lines 30-43).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by storing the measured time each packet spends in the queue (Field: col. 3 line 34 - col. 4 line 5) in a circular buffer that uses a pointer to point to the next queue location to be written to. This modification can be performed according to the teachings of Bernings. This modification would enable the system to store and access the measured time information.

5. Claim 5 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as

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applied to claim 1 above, and further in view of Wecker (US 6,289,464).

The combination is silent on the number of trace record entries associated with each one of the trace records is prespecified corresponding to a designed PDU processing throughput of the data switching node.

Wecker teaches the number of number of trace record entries / size of memory is proportional to the throughput / rate (fig. 5 box 64, col. 9 lines 43-50). Note the examiner corresponds the applicant's size of number of trace record entries with the reference's size of memory. Furthermore, a switches throughput is proportional to the input data rate.

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by having the size of the trace records / buffer size proportional to the throughput of the switch. This modification can be accomplished by setting the buffer size according to accommodate the input data rate. This would benefit the system by not wasting memory, yet at the same time providing sufficient memory for processing the input data.

6. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as

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applied to claim 1 above, and further in view of Weir (US 5,748,627).

The combination is silent on the number of trace record entries associated with each one of the trace records is variable, the number of entries being adjustable via a one of a manual setting, management console, and a higher level protocol optimizing resources available for a current PDU processing throughput.

Weir teaches the number of trace record entries / buffer length associated with each one of the trace records is variable, the number of entries being adjustable via a one of a manual setting (initially set, buffer length is set, col. 34 lines 28-37). Note, the examiner corresponds the applicant's manual setting with the method of setting the buffer length in Weir.

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by setting the buffer size dependent upon the data rate. This modification can be performed by using a variable length buffer. This would benefit the system by not wasting memory, yet at the same time providing sufficient memory for processing the input data.

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7. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as applied to claim 1 above, and further in view of Brown (US 6,754,211).

Regarding claim 7, as previously addressed, the combination teaches a time value indicative of the time at which the corresponding PDU was deemed to be received (Field: fig. 4 element TS, time stamp field TS, col. 2 lines 33-37, fig. 2 box 12, time stamp field TS provide an accumulative value of the transmission delay, col. 3 line 31 - col. 4 line 5).

The combination is silent on identifying information corresponding to the received PDU.

Brown teaches identifying information corresponding to the received PDU (stores a pointer to the location of the packet in memory, col. 1 lines 59-61).

Regarding claim 8, the combination is silent on identifying information comprises a specific location at which the PDU is stored pending processing.

Brown teaches identifying information comprises a specific location at which the PDU is stored pending processing (stores a

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pointer to the location of the packet in memory, col. 1 lines 59-61).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by incorporating within each trace record a pointer to the location of each packet. This modification can be performed according to the teachings of Brown. This would benefit the system by providing the packet controller (Field: fig. 2 box 12) with a means for accessing each individual packet.

8. Claim 9 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field, Saunders, and Brown as applied to claim 7 above, and further in view of Abu-Amara (US 5,870,396).

The combination is silent on identifying information corresponding to the received PDU comprises a specification of a port via which the PDU was received.

Abu-Amara teaches identifying information corresponding to the received PDU comprises a specification of a port via which the PDU was received (second subqueue to store the input port

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number at which a data packet was received, col. 21 lines 54-59).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field, Saunders, and Brown to store the input port number of each received packet. This modification can be performed according to the teachings of Brown. This modification would benefit the system by providing a method for the system to know which input port the data packet came in on. This would be useful for the system if the switch has to send a message to the packet source.

9. Claim 10 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field, Saunders, and Brown as applied to claim 7 above, and further in view of Lin (US 4,937,817).

The combination is silent on a specification of a destination context corresponding to the received PDU.

Lin teaches a specification of a destination context / address corresponding to the received PDU (fig. 2 box 108, 126, storing the destination address of a packet in buffer, col. 6 lines 46-50).

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Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field, Saunders, and Brown by storing the destination address of the received packet. This modification can be performed according to the teachings of Lin. This modification would benefit the system by providing a method for informing the system of the destination address of each packet that is to be output.

10. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as applied to claim 1 above, and further in view of Brown (US 6,754,211).

Regarding claim 11, as previously addressed, the combination teaches a time value indicative of the time at which the corresponding PDU was deemed to been processed (Field: measure the time each packet spends in the queue, col. 3 line 34 - col. 4 line 5).

The combination is silent on identifying information corresponding to the PDU.

Brown teaches identifying information corresponding to the processed PDU (pointer to the location of the packet in memory, col. 1 lines 59-61).

Regarding claim 12, the combination is silent on identifying information comprises a specific location at which the PDU is stored pending processing.

Brown teaches identifying information comprises a specific location at which the PDU is stored pending processing (pointer to the location of the packet in memory, col. 1 lines 59-61).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by incorporating within each trace record a pointer to the location of each packet. This modification can be performed according to the teachings of Brown. This would benefit the system by providing the packet controller (Field: fig. 2 box 12) with a means for accessing each individual packet.

11. Claim 13 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field, Saunders, and Brown as applied to claim 11 above, and further in view of Abu-Amara (US 5,870,396).

The combination is silent on identifying information corresponding to the received PDU comprises a specification of a port via which the PDU was received.

Abu-Amara teaches identifying information corresponding to the received PDU comprises a specification of a port via which the PDU was received (second subqueue to store the input port number at which a data packet was received, col. 21 lines 54-59).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field, Saunders, and Brown to store the input port number of each received packet. This modification can be performed according to the teachings of Brown. This modification would benefit the system by providing a method for the system to know which input port the data packet came in on. This would be useful for the system if the switch has to send a message to the packet source.

12. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field, Saunders, and Brown as applied to claim 11 above, and further in view of Lin (US 4,937,817).

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Regarding claim 14, the combination is silent on a specification of a destination context corresponding to the received PDU.

Lin teaches a specification of a destination context corresponding to the received PDU (fig. 2 box 108, 126, storing the destination address of a packet in buffer, col. 6 lines 46-50).

Regarding claim 15, the combination is silent on destination context corresponding to the processed PDU includes a port via which the PDU is to be forwarded towards an intended destination.

Lin teaches a destination context corresponding to the processed PDU includes a port / destination address via which the PDU is to be forwarded towards an intended destination (fig. 1 box 109, 103, destination address representing an output port 103, col. 4 lines 22-27). Note, Lin shows the correspondence between the destination address and output port.

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field, Saunders, and Brown by storing the destination address of the received packet. This modification can be performed

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according to the teachings of Linn. This modification would benefit the system by providing a method for informing the system of the destination address of each packet that is to be output.

13. Claim 16 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field, Saunders, Brown, and Lin as applied to claim 14 above, and further in view of Jacobson (US 6,934,256).

Regarding claim 16, the combination is silent on specification of the destination context corresponding to the processed PDU includes a specification that the PDU is to be dropped.

Jacobson teaches specification that the PDU is to be dropped (dropped packet record, col. 13 lines 31-38).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by determining if each packet should be and recording whether the packet was dropped or not. This modification can be performed according to the algorithm of

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Jacobson. The suggestion for the modification is to perform congestion control (Jacobson: col. 13 lines 31-38).

14. Claim 18 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as applied to claim 17 above, and further in view of Brown.

The combination is silent on a PDU pointer entry with a value indicative of a location at which the corresponding PDU is temporarily stored.

Brown teaches a PDU pointer entry with a value indicative of a location at which the corresponding PDU is temporarily stored (pointer to the location of the packet in memory, col. 1 lines 59-61).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the combination of Field and Saunders system of by incorporating within each trace record a pointer to the location of each packet. This modification can be performed according to the teachings of Brown. This would benefit the system by providing the packet controller (Field: fig. 2 box 12) with a means for accessing each individual packet.

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15. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as applied to claim 17 above, and further in view of Jacobson (US 6,934,256).

Regarding claim 19, the combination is silent on populating one of the trace record with information indicating of a PDU discard in the case of a PDU drop instance.

Jacobson teaches recording information indicating of a PDU discard in the case of a PDU drop instance (dropped packet record, col. 13 lines 31-38).

Regarding claim 20, the combination is silent on calculating a PDU drop indication corresponding to each stream of data conveyed by the data switching node.

Jacobson teaches calculating a PDU drop indication corresponding to each stream of data conveyed (algorithm drops packets to control the queue, based on statistical properties, col. 13 lines 31-38).

Regarding claim 21, the combination is silent on calculating a PDU drop indication corresponding to a current operational state of the data switching node.

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Jacobson teaches calculating a PDU drop indication (algorithm drops packets to control the queue, based on statistical properties, col. 13 lines 31-38). Note, as previously addressed, the combination of Field and Saunders teaches evaluating / measuring the performance of the data switching node corresponding to a current operational state / latency (Saunders: [0015], latency is the delay suffered by a packet during its travel, time packet arrives at a router until it leaves for the next router/switch latency).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by determining if each packet should be dropped and recording whether the packet was dropped or not. This modification can be performed according to the algorithm of Jacobson. The suggestion for the modification is to perform congestion control (Jacobson: col. 13 lines 31-38).

16. Claim 25 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as applied to claim 23 above, and further in view of Bare (US 6,577,600).

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Although the combination teaches determining a PDU processing delay / latency, the combination is silent on determining an average PDU processing delay incurred at the data switching node by calculating an average of the PDU processing delays incurred by corresponding PDUs.

Bare teaches determining an average PDU processing delay incurred at the data switching node by calculating an average of the PDU processing delays incurred by corresponding PDUs (latency, weighted average, col. 6 lines 41-45).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by calculating an average latency. This modification can be performed by averaging the latencies of several consecutive processed PDUs. This would benefit the system by providing a better indication of the expected latency associated with the switch.

17. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Field and Saunders as applied to claim 23 above, and further in view of Li (US 6,567,408).

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Regarding claims 26, although the combination determining a PDU processing delay for at a particular switch, the combination is silent on determining a PDU conveyance jitter / jitter for a stream of data by determining the distribution of PDU processing delays incurred by a plurality of PDUs associated with a stream of data.

Regarding claim 26, Li teaches determining a PDU conveyance jitter / jitter for a stream of data by determining the distribution of PDU processing delays incurred by a plurality of PDUs associated with a stream of data (jitter- a measure of variation in the delay, width of the distribution function, probability that packet will experience a particular delay, col. 3 lines 4-14).

Regarding claims 27, although the combination teaches determining a PDU processing delay for at a particular switch, the combination is silent on determining a PDU conveyance jitter / jitter for the data switching node by determining the distribution of PDU processing delays incurred by a plurality of PDUs forwarded by the data switching node.

Regarding claim 27, Li teaches determining a PDU conveyance jitter / jitter by determining the distribution of PDU processing delays incurred by a plurality of PDUs associated

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with a stream of data (jitter- a measure of variation in the delay, width of the distribution function, probability that packet will experience a particular delay, col. 3 lines 4-14).

Therefore it would have been obvious to one of ordinary skill in the art, to modify the system of the combination of Field and Saunders by calculating the jitter based on a plurality of delays associated with the processed PDUs at each switch. This modification can be performed according to common algorithms for calculating jitter. The suggestion for the modification is different applications require different levels of QoS / jitter (Li: col. 3 lines 13-14). A jitter calculation for each switch would benefit the system by providing the system with information for routing based upon the jitter at each switch.

### **Conclusion**

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ronald Abelson whose telephone number is (571) 272-3165. The examiner can normally be reached on M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on (571) 272-3174. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*RA*  
Ronald Abelson  
Examiner  
Art Unit 2666

*Ronald Abelson*

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